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(54) Title: METHOD OF DISPENSING AND DISPENSING CONTAINER			
(57) Abstract			
<p>The invention concerns a container (50) from which is extruded semi-solid food product by the use of dispensing apparatus. The container is of unitary construction having a base portion (51) and a deformable portion (52) and is formed of plastics. An opening (57) is formed in the container through which the container is both filled and discharged. Discharge is by deforming the deformable portion into the base portion to obtain complete emptying. It is preferred that the container is formed in one operation by blow moulding and the container may be filled with the deformable portion initially located within the base portion.</p>			

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METHOD OF DISPENSING AND DISPENSING CONTAINER

This invention relates to a dispensing container for use with dispensing apparatus whereby product is stored in and dispensed from the container.

An object of the invention is to provide improved dispensing containers, a method of dispensing from such containers and apparatus for use with such containers in dispensing food products.

According to one aspect the invention provides a method of dispensing semi-solid product from a container having a base portion and a deformable portion, wherein the base portion and the deformable portion are formed of plastics as an integral unit to define a space for receiving product within the container, forming an opening in the container through which product is admitted to the container during filling of the container, locating the container on a seating so as to support the container during dispensing, deforming the deformable portion into the base portion by the application of pressure to the deformable portion to deform the deformable portion towards the base portion to cause product in the container to be discharged by extrusion from the container through said opening, the deformable portion taking up the internal shape of the base portion to cause emptying of product from the container.

The container may be formed with an outwardly directed flange like portion between the two portions whereby the container may be located and the deformable portion engaged by deforming means to deform the deformable portion. The flange portion may be located between the deformable portion and the base portion to define the junction between the portions.

By forming the container as an integral blow moulding substantial savings can be achieved compared with injection moulding but injection moulding can be used if the portions are formed separately. The cost of a blow moulding tool is considerable less than an injection moulding tool and multiple impression tools may be more readily provided.

In one arrangement the containers are produced in multiple units and are interconnected to form a chain of containers which are readily separated from one another between the production, filling and use of the container in a dispensing machine.

A dispensing machine for use with the dispensing container may be generally of the form described and illustrated in PCT patent specification WO 96/01224 of the applicant.

The outlet opening of the container may be shaped to shape product discharged from the container. For example the outlet opening may be star-shaped. Sealing means may be located over the outlet opening when filled, to be removed for discharge of product.

The container is usually filled through the outlet opening after the container has been formed as one unit. In one arrangement the deformable portion of the container is located inside the base portion prior to filling and product is forced into the container to deform the deformable portion outwardly towards its full capacity. Alternatively compressed air, a plunger engaging the inside of the container or suction on the outside of the deformable portion may be used to deform the container outwards.

According to another aspect the invention provides a dispensing container for carrying out the method of the invention and for use with dispensing apparatus to dispense semi-solid food product from the container, the container comprising a base portion defining a seating surface by which the container is supported during dispensing of product from the container, the container having at least one outlet opening through which product is extruded during dispensing by operation of the dispensing apparatus, and a deformable portion which is deformable into the base portion to take up the internal shape of the base portion and to reduce the internal volume of the container during dispensing and thereby cause product to be extruded through said outlet opening to empty the container, the container being formed of plastics material and the base portion and the deformable portion being of integral construction.

Further features of the invention will appear from the following description of an

embodiment of the invention given by way of example and with reference to the drawings, in which:-

Fig 1 is a cross section through a filled dispensing container,

Fig 2 is a view in the direction of arrow 2 in Fig 1,

Fig 3 is a vertical section through part of a dispensing machine suitable for the container of Figs 1 and 2,

Fig 4 is a vertical section through a second embodiment of the invention,

Fig 4A and 4B are views of the base of a container in the direction of arrow A in Fig 4,

Fig 5 is a vertical section through a third embodiment of the invention, and

Figs 6A-6O show various shapes for the container opening.

Referring to the drawings, and firstly to Figs. 1 and 2, there is shown a dispensing container 50 intended particularly for food product of viscous or semi-solid consistency, the food product being discharged from the container by an extrusion process. In Fig 1 there is shown, in chain lines, a container of a different size but employing the same or similar features to the full line drawing described.

The container 50 is in two portions a base portion 51 and a deformable portion 52. The base portion 51 is formed with an opening 57 which, as illustrated, is of star-shape (Fig 2). The opening 57 acts as a discharge outlet for discharging product from the container and also as an inlet through which product is introduced into the container.

Intermediate the deformable portion 52 and the base portion 51 is an outwardly directed portion or flange 65 which, as will be described, is provided to enable the container to be located during the dispensing operation. The deformable portion 52 is of generally circular cross section being tapered over a region 63 at a small angle of taper, merging into a curved portion 62 and then into a flat portion 61. Centrally of the flat portion 61 is formed a dimple 61A corresponding in position to the outlet 57 in the base portion 51 but this may be omitted. The flat portion 61 may instead be of domed shape.

The base portion 51 is shaped corresponding to the deformable portion 52 having tapered

side walls 53 and a curved portion 56 merging into a flat portion 55 at the centre of which is the opening 57. The dimensions of the base portion 51, in particular the internal diameter of the tapered portion 53, is slightly larger than the internal diameter of the walls 63 of the deformable portion 52 so that the deformable portion may be accommodated in the base portion as shown by the chain lines 52' in Fig 1. The opening 57 may be formed with an outwardly directed nozzle 57A of generally cylindrical or other shape terminating in a shaped outlet. In another arrangement the side walls 53 are not tapered but substantially parallel-sided. Alternatively the nozzle 57A may be omitted.

The container 50 is preferably made as a one piece, integral blow moulded plastics container using suitable plastics material which provides the necessary deformability of the portion 52. Multiple mould cavities may be provided adjacent one another and the containers 50, when moulded, may be attached to one another by connectors, such as shown at 60 in Fig 2, or by a connection extending across the full width of the containers 50. Connector 60 may interconnect successive containers 50 to form a chain or other array of containers, the connector 60 being readily parted by cutting, breaking or other means to disconnect the containers from one another. After forming a chain or other array of containers 50 the containers may be separated or remain connected together up to or during a subsequent filling operation and, if required, until the filled containers are ready for use.

The containers 50 when made may remain in the form shown in Figs. 1 and 2 after being moulded. Alternatively the deformable portion 52 may be deformed by convenient means such as a plunger into the base portion 51 to reduce the space occupied by the containers 50. In this form containers 50 may be nested inside one another and thereby take up less space for transport. Subsequent to manufacture of a container 50 it is filled with product through the opening 57 using suitable nozzle means for introducing product, the container preferably being in the inverted position during filling. The product may be liquid or semi-solid during filling and subsequently frozen to a semi-solid form for storage and dispensing.

If the container 50 has had the deformable portion 52 deformed into the base portion 51 prior to filling, the filling operation may force the deformable portion 52 towards the position

shown in Fig 1. This can be achieved by locating a nozzle in sealing contact with the opening 57 or associated outlet nozzle 57A during filling, by introducing compressed air, or by physically pushing or pulling the deformable portion to the full capacity position..

After filling of the container 50 the opening 57 or nozzle 57A is sealed. Usually in the case where product may escape from the opening, sealing is by use of a removable seal (not shown) applied over the opening 57 or nozzle 57A, the seal being attached by adhesive and having a portion which may be gripped to peel the seal off the container when dispensing of its contents is required. Alternatively, especially when the product is frozen or is to be frozen and less likely to escape from the container, the container may be enveloped in a package, removable before dispensing of the container contents. As a further alternative a snap-on closure member (not shown) may be located in the opening, the member having means for removal of the member before dispensing.

Although it is preferred to make the container as a blow moulding in one piece the container may also be made by injection moulding, blow moulding, vacuum forming or thermo forming the portions 51 and 52 and then uniting these portions by welding or otherwise securing them together at the flange portion 65 to make an integral unit.

The container of the invention may be employed in a dispensing apparatus of the kind described in patent application PCT/GB95/01557 (publication WO96/01224). Apparatus of this kind, modified to suit the container of the invention, is shown, in part, in Fig 3. It will be seen that during dispensing of the contents of the container 50 it is located on a seating 43, having removed any seal from the outlet opening 57, the flange 65 being located on the seating 43. The seating 43 includes a central opening 45 through which product from the opening 57 is discharged.

A plunger 37 engageable with the deformable portion 52 of the container 50 is driven reciprocally and mounted on a piston rod 23. The piston 36 has a flat portion 37 generally corresponding to the flat portion 61 of the deformable portion 52 and a curved portion 38 corresponding to the curved portions 62 and 56 of the container portions 52 and 51

respectively. A spring-urged disc 31 is located on the piston rod 23 and engaged by locating means 32 through a spring 40. The disc 31 and locating means are guided in a cylinder 26 of the assembly 24 having a cover 29. However the cylinder 26 and cover 29 may be omitted. The locating means 32, spring 40 and disc 31 may also be omitted.

Before the piston 36 engages the deformable portion 52 of the container 50 the container 50 is located on the seating 43 by downward movement of the locating means 32 into engagement with the flange 65 of the container 50 and with the top surface of the seating 43. The piston 36 then moves downwards along a cylindrical portion 33 of locating means 32 and into engagement with the deformable portion 52 deforming it downwardly towards the base of the portion 51 until the deformable portion adopts the position 52' in engagement with the inner surface of the base portion 51 in which the container is substantially emptied.

During deformation of the deformable portion 52 product is discharged by extrusion through the opening 57 downwardly into a container (not shown) for the product located beneath the opening 57, the product being shaped by the shape of the opening 57 as it is discharged.

Upon completion of a discharge operation the piston 36 and piston rod 23 are withdrawn upwardly allowing the empty container 50 to be removed from the seating 43.

Other aspects of the discharge apparatus can be as described in WO96/01224.

In Fig 1 there is shown in chain lines a container of smaller capacity which can be employed in the same or similar dispensing apparatus to the container shown in full lines. In both cases the base portion 51 of the container may be of thicker material than the deformable portion 52 to give added strength. The base portion 51 may also be ribbed for added strength. With this arrangement the container may not need to be supported at its underside during dispensing, only around the flange 65. Alternatively a different seating may be employed for the larger container. Moreover the stroke of the piston 36 may be increased or selectively made longer or shorter depending on the size of the container being dispensed.

As another alternative or in addition, the drive to the piston has detection means for detecting the dispensing force. In this way when the force exceeds a predetermined amount movement of the piston ceases, indicating that a container has been emptied on the piston reaching the base of the container, irrespective of the size of container used. The detection means may detect the fluid pressure in a fluid operated piston, or a load cell or transducer may be used.

The deformable portion 52 of the container 50 may in each case be formed with a central portion 61A' which extends outwards, as shown, prior to engagement by the piston 36. When deformation of the portion 52 commences, the portion 61A' deforms inwards to ensure product is discharged through the outlet 57 over the final movement of the piston, especially if a nozzle 57A is associated with the outlet 57. Alternatively the central portion 61A' may be directed inwardly initially.

Although there is described that the outlet 57 is formed in the base portion 51 of the container 50, the outlet can be formed in the deformable portion. The container 50 can be discharged by a piston moving upwards to engagement with the deformable portion 52 instead of downwards, as shown.

Instead of the container having a circular cross section, as shown, the container may be of other shapes such as elliptical, rectangular with rounded corners, or of other curvilinear shape.

Referring to Figs.4, 4A and 4B of the drawings there is shown an alternative container in which the same reference numbers are given to parts which are similar to those of the previous embodiment. In this embodiment the container 50 is of somewhat different shape to that of the previous embodiment but still including flat portions 55 and 61 on the base portion 51 and deformable portion 52 respectively. There are also curved portions 56 and 62 on the base portion 51 and deformable portion 52 respectively. The base portion 51 is normally supported during dispensing on a support or seating such as shown at 69.

The container 50 is provided with a circumferential flange 65 which, in this case, is located

on supports 43. The outlet 57 is provided with a nozzle portion 57A and around the nozzle portion 57A is provided a nozzle adaptor 70 which tapers in the outwards direction and has at its outer end flexible triangular portions 71 coming together at their points at the central axis and being attached at their outer edge to be able to flex downwardly under the pressure of product being discharged from the container 50. Fig 4A shows the nozzle closed with the portions 71 in their upper position. Fig 4B shows the portions flexed downwardly during discharge to create an outlet opening 57 through which the product is discharged thereby shaping the product. The portions 71 may be connected together along weakened lines between the portions and the pressure of product being discharged causes the portions to become separated along said weakened lines. Thus the adaptor 70 provides a valve by which the discharge of product is controlled. Such control is effected in conjunction with the operation of the plunger 36 which is arranged for reciprocal movement into engagement with the deformable portion 52 in the manner previously described. The plunger 36, after a dispensing action has the discharge pressure released from it and the plunger may also be withdrawn slightly to prevent further discharge of product. When the pressure is taken off the plunger 36 the portions 71 close up to the position shown in Fig 4A to seal the outlet.

As an alternative, flexible portions similar to portions 71 may be provided in the opening 57 when the adaptor 70 is omitted.

Referring now to Fig 5 there is shown another form of container 50 and associated plunger 36. In this case the container 50 is of somewhat different shape and the outwardly directed flange 65 is replaced by an outwardly directed curvilinear portion 65A. By provision of the portion 65A the deformable portion 52 is able to be deformed into the base portion 51 in the manner previously described without the need for the constraint of the flange. The deformable portion 52 has a central flat portion 61 (which may be domed) and a curved portion 52 in a similar manner to the previous embodiments, which deform into the base portion and to adjacent the corresponding portions 55 and 56. The base portion 51 is conveniently supported on a seating (not shown) during discharge and operation of the plunger 36.

The present invention provides considerable advantages over previous containers in being cheap and simple to manufacture having regard both to the necessary tooling and the material from which the containers are made.

The container of each embodiment may contain one or multiple portions of product. In the case of multiple portions the dispensing of product from the container may be by discharge of the desired quantity, retaining the remaining product in the container until the next portion is to be dispensed. A shut-off valve may be associated with the outlet, such as shown in Fig 4, or by loading the product to a valve sealingly connected to the outlet and operable to enable the outlet to be opened and closed.

CLAIMS

1. A method of dispensing semi-solid product from a container having a base portion and a deformable portion, wherein the base portion and the deformable portion are formed of plastics as an integral unit to define a space for receiving product within the container, forming an opening in the container through which product is admitted to the container during filling of the container, locating the container on a seating so as to support the container during dispensing, deforming the deformable portion into the base portion by the application of pressure to the deformable portion to deform the deformable portion towards the base portion to cause product in the container to be discharged by extrusion from the container through said opening, the deformable portion taking up the internal shape of the base portion to cause emptying of product from the container.
2. A method according to Claim 1 wherein the container is formed as an integral blow moulding in one piece.
3. A method according to Claim 1 or 2 wherein the deformable portion is located within the base portion prior to filling the container with product and during filling the deformable portion is moved away from the base portion to accommodate the product.
4. A method according to Claim 3 wherein the movement of the deformable portion away from the base portion during filling is by pressure of product entering the container, by admitting pressurised air into the container, by pressing or drawing the deformable portion away from the base portion, or by a combination of two or more of these actions.
5. A method according to Claim 3 or 4 wherein the container is nestable with other containers when the deformable portion is located within the base portion.
6. A method according to any one of Claim 1-5 wherein the base portion and the deformable portion are formed as individual portions which are permanently united together to form an integral construction.

7. A method according to Claim 6 wherein the base portion and the deformable portion are of circular shape and are each formed with outwardly directed radial flanges which are welded together to unit the portions together prior to filling the container with product.
8. A method according to Claim 6 wherein an outwardly directed flange is provided between the base portion and the deformable portion.
9. A method according to any one of the preceding claims wherein the deformable portion is of generally cup shaped which, during deformation, is inverted in moving towards the internal surface of the base portion which is of similar cup shape.
10. A method according to any one of the preceding claims wherein the opening is formed in the central part of the base portion.
11. A method according to any one of the preceding claims wherein the container is formed linked with others of said containers.
12. A method according to any one of the preceding claims wherein product is introduced into the container as flowable liquid and the filled container is cooled to freeze the product in the container.
13. A method according to any one of the preceding claims wherein the container is filled with product by introducing a nozzle into said opening through which nozzle product is introduced into the container.
14. A method according to Claim 13 wherein the nozzle is located in sealing contact with the opening during filling of the container.
15. A method according to any one of the preceding claims wherein the opening is closed by a releasable closure member after the container is filled with product.

16. A method according to any one of the preceding claims wherein the deformable portion is deformed by the application of a plunger to the deformable portion, the plunger having an operative surface corresponding in shape to the shape of the internal surface of the base portion.

17. A method according to any one of the preceding claims wherein the seating for the base portion is defined by an outer edge of the base portion or by a curvilinear outer surface of said base portion extending around said opening.

18. A dispensing container for carrying out the method of the invention and for use with dispensing apparatus to dispense semi-solid food product from the container, the container comprising a base portion defining a seating surface by which the container is supported during dispensing of product from the container, the container having at least one outlet opening through which product is extruded during dispensing by operation of the dispensing apparatus, and a deformable portion which is deformable into the base portion to take up the internal shape of the base portion and to reduce the internal volume of the container during dispensing and thereby cause product to be extruded through said outlet opening to empty the container, the container being formed of plastics material and the base portion and the deformable portion being of integral construction.

19. A dispensing container according to Claim 18 wherein the container is formed in one piece by blow moulding.

20. A dispensing container according to Claim 18 or 19 wherein the outlet opening is formed in the base portion.

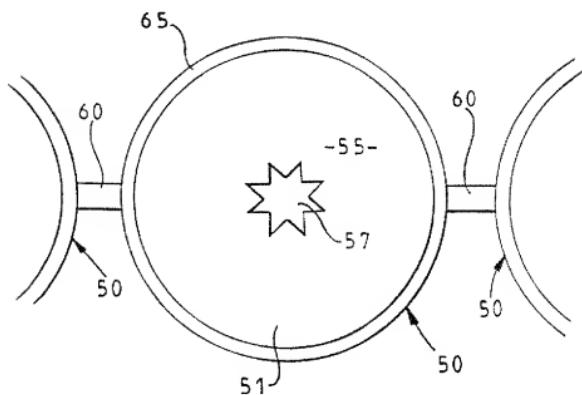
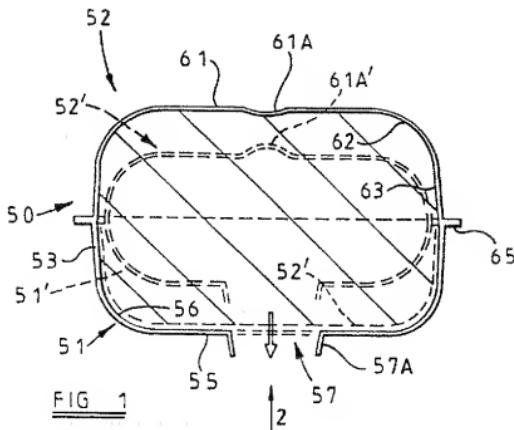
21. A dispensing container according to any one of Claim 18-20 wherein the container has an outwardly directed portion intermediate the base and deformable portions.

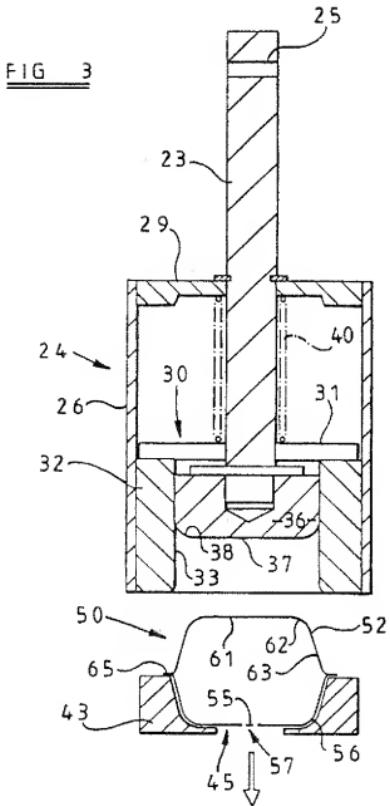
22. A dispensing container according to Claim 21 wherein the outwardly directed portion is in the form of a circular flange.

23. A dispensing container according to any one of the preceding claims wherein the outlet opening is sealed by releasable sealing means.
24. A dispensing container according to any one of the preceding claims wherein the container is releasably connected to other similar containers.
25. A dispensing container according to any one of Claims 18-24 wherein the outlet opening is shaped to define the shape of product extruded through said opening.
26. A dispensing container according to Claim 25 wherein the outlet opening is shaped to shape product discharged therefrom and is of star shape, triangular shape, discontinuous or continuous annular shape, square shape, X-shape, thin rectangular shape, or a circular shape.
27. A dispensing container according to any one of Claims 18-26 comprising a closure member for the outlet opening which member is releasably located over said opening and is in the form of an adhesive strip.
28. A dispensing container according to any one of Claims 18-27 wherein the container is fillable with product through the outlet opening.
29. A dispensing container according to any one of Claims 18-28 wherein the base portion and the deformable portion are correspondingly cup shaped upwardly and downwardly respectively and, during deformation, the deformable portion is moved into the base portion to take up the shape of the internal surface of the base portion while the container is supported on said seating surface.
30. A dispensing container according to any one of Claims 18-29 wherein the container is shaped to be nestable with other containers when the deformable portion is located adjacent the internal surface of the base portion.

31. A dispensing container according to Claim 30 wherein in the nestable position of the container the container has a part-spherical base and an outwardly flared upper portion defining a space for receiving the base of another container.
32. A dispensing container according to Claim 18 wherein the base portion and the deformable portion are separately formed from plastics material each with outwardly directed flanges and the portions are made integral by interconnecting the respective flanges.

1/6





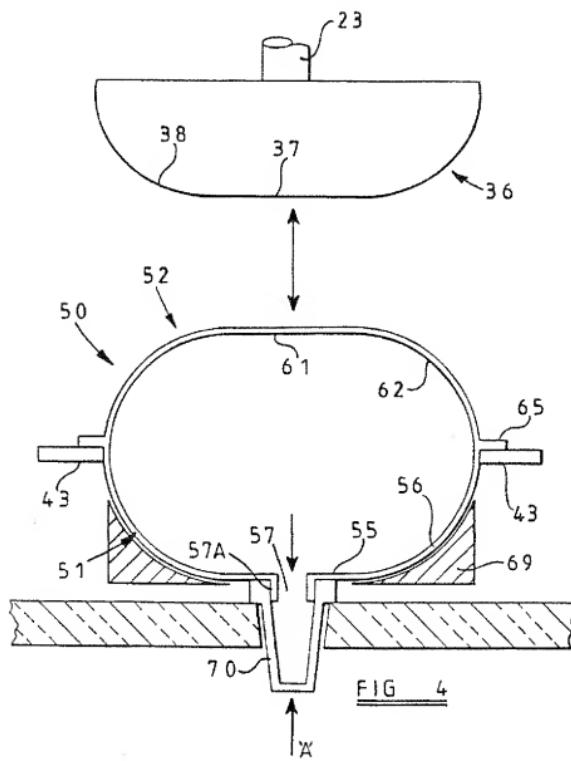


FIG. 4A

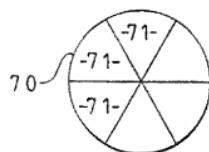
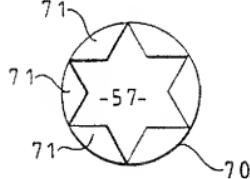


FIG. 4B



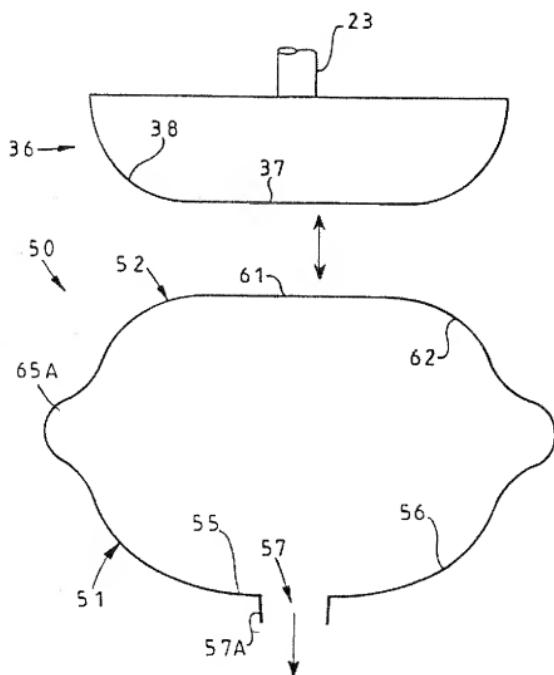


FIG 5

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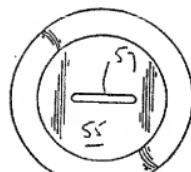


FIG. 6A

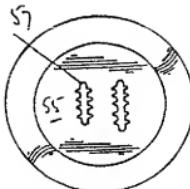


FIG. 6B

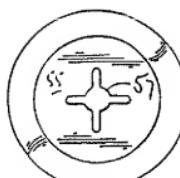


FIG. 6C

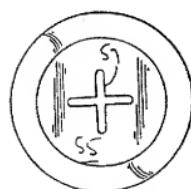


FIG. 6D

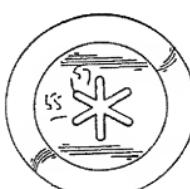


FIG. 6E

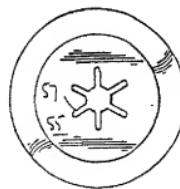


FIG. 6F

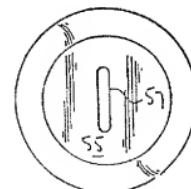


FIG. 6G

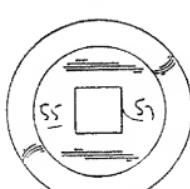


FIG. 6H

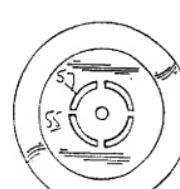


FIG. 6I

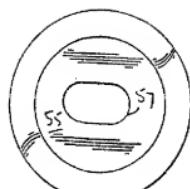


FIG. 6J



FIG. 6K



FIG. 6L

6/6



FIG 6M

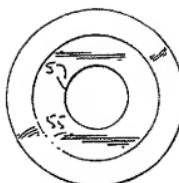


FIG 6N

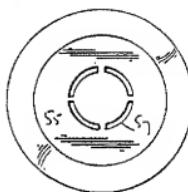


FIG 6O

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 97/01196

A. CLASSIFICATION OF SUBJECT MATTER IPC 6 B65D83/00 A23G9/28 A23G3/28		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC 6 B67D B65D A23G		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 96 01224 A (MCGILL TECHNOLOGY LTD) 18 January 1996 cited in the application	1,6-10, 12, 15-18, 20-23, 25-29,32
Y	see page 30, line 10 - page 32, line 14 see figures 12,13,17	11,13, 14,19,24
X	WO 94 13154 A (UNICE INTERNATIONAL LTD) 23 June 1994	1,6-8, 10,12, 15-18, 20-23, 25-27,32
A	see page 9, line 26 - page 14, line 27 see figures 1,1B,3,5	11,24, 29-31

	-/-	
<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C.		<input type="checkbox"/> Patent family members are listed in annex.
* Special categories of cited documents:		
A document defining the general state of the art which is not considered to be of particular relevance		
E earlier document but published on or after the international filing date		
L document which may throw doubts on priority claims; or which is cited to establish the publication date of another citation or other special reason (as specified)		
O document referring to an oral disclosure, use, exhibition or other means		
P document published prior to the international filing date but later than the priority date claimed		
1. Date of the actual completion of the international search 9 September 1997		Date of mailing of the international search report 19.09.97
Name and mailing address of the ISA European Patent Office, P.O. Box 5818 Patentlaan 2 2200 DG The Hague Tel. (+ 31-70) 340-2000, Tx. 31 651 epo nl Fax. (+ 31-70) 340-3016		Authorized officer Smolders, R

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 97/01196

C(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	see column 2, line 38 - column 4, line 52 see figures 1-8 ---	5,13,18, 20-23, 28-32
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A	see figures 1,2 ---	18,20, 23,28
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